19th. No special benefits have been reported from either.

Winter weather conditions appear on the 1st, which fact was announced on the map of that date.—*B. S. Pague, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

During the month eight highs and the same number of lows had sufficiently well defined tracks to be followed. (See Charts I and II.) In the accompanying table will be found some of the principal points regarding the first and last appearance, duration, length of track, and apparent velocity of these areas, and the following description, more in detail, is added.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, p.m.	52	115	7, p.m.	41	68	2,670	6.0	445	18.5
II	6, p.m.	48	108	10, p.m.	39	69	2,670	4.0	668	27.8
III	8, a.m.	37	124	13, p.m.	40	70	3,050	5.5	555	23.1
IV	11, p.m.	46	127	21, p.m.	45	60	5,460	10.0	546	22.7
V	14, p.m.	42	126	17, p.m.	42	109	1,680	3.0	560	23.3
VI	18, a.m.	47	122	26, a.m.	48	55	5,470	8.0	684	28.5
VII	23, a.m.	53	107	29, p.m.	48	61	4,200	6.5	646	26.9
VIII	26, a.m.	43	126	4, p.m.*	43	62	4,380	9.5	461	19.2
Total							29,580	52.5	4,565	190.0
Mean of 8 paths							3,698		571	23.8
Mean of 52.5 days									563	23 5
Low areas.										
I	†29, p.m.	21	71	6, p.m.	47	54	3,510	7.0	502	20.9
II	†30, p.m.	40	111	2, p.m.	51	99	1,140	2.0	570	23.8
III	8, p.m.	53	115	12, p.m.	49	55	3,000	4.0	750	31.2
IV	12, m	43	99	16, p.m.	48	55	2,310	4.5	513	21.4
V	13, p.m.	52	117	19, p.m.	48	88	3,180	6.0	530	22.1
VI	18, p.m.	32	102	23, p.m.	47	59	3,300	5.0	660	27.5
VII	22, p.m.	46	105	27, a.m.	48	68	2,370	4.5	527	21.9
VIII	26, a.m.	51	111	31, a.m.	46	57	3,240	5.0	648	27.0
Total							22,050	38.0	4,700	195.8
Mean of 8 paths							2,756		588	24.5
Mean of 38 days									580	24.2

* November. † September.

Highs.—Five of the highs were first noted off the north Pacific coast, and the rest were first seen to the north of Montana. The general tendency was toward the lower Mississippi valley, and thence northeastward to the north Atlantic coast. Nos. I, II, and III were last seen off the New England coast, and IV, VI, VII, and VIII over Newfoundland, while V gradually disappeared in Wyoming.

No decided cold waves were experienced with these highs. A fall in temperature of 30° in twenty-four hours occurred at Moorhead a. m. of the 3d. At Denver, p. m. of the 15th, the temperature fall was 34°; at Dodge City, p. m. 24th, 36°.

Lows.—In the case of the lows not one began on the Pacific coast. There seems to have been an area of low pressure, rather permanent in Montana, and to the north and most of the lows started from this. No. I began as a hurricane in the West India Islands. (See the description of the hurricane of September 29–October 2, p. 439.) The general track of the lows was a little to the north of that of the highs, and six of them were last noted in the Gulf of St. Lawrence or Newfoundland. The highest winds of the month were as follows: 52 miles an hour at Savannah, a. m. of 2d, as No. I moved upon the coast; 64 miles at Charleston, and 60 miles at Savannah p. m. of 2d. On evening of 11th, as No. III moved down the St. Lawrence, Buffalo reported 52 miles. Eastport reported 56 miles p. m. of 15th, as No. IV moved up the Atlantic coast. Chicago reported 64 miles evening of 17th, as No. V moved to the Lake region. In connection with the same storm Cape May reported 56 miles evening of 18th. On the afternoon of 22d Buffalo experienced 56 miles an hour as low No. VI moved down the St. Lawrence.—*H. A. Hazen, Professor.*

RIVERS AND FLOODS.

The precipitation during the month of October was largely in excess throughout the watersheds of the navigable rivers, and, as a consequence, stages were much above the average for the time of the year. With a few minor exceptions navigation could have been continued almost uninterruptedly, and, in fact, it did continue, except from Memphis southward, where the quarantine regulations almost completely paralyzed it during the greater portion of the month. Otherwise, traffic was unusually active. An immense amount of coal, iron, and lumber products moved down the Ohio from Pittsburg, while on the Cumberland and the rivers of South Carolina the amount of business largely exceeded that of previous Octobers.

A few floods of limited duration and extent occurred during the month. The heavy rain of the 5th caused a marked rise in the Hudson with, however, but slight resulting damage beyond the temporary inconvenience to navigation. In the Hoosic Valley a cloudburst caused damage to an amount exceeding $25,000.

Heavy rains on the 4th caused a rapid rise in the Alabama and tributaries, and damage amounting to several thousand dollars was done to outstanding crops in the bottoms. Ample warning had been given of the rise, and all movable property was removed to places of safety. At Montgomery a stage of 28.8 feet was recorded, only 0.2 foot below that given in the warnings as likely to be reached.

General rains in the South Atlantic States on the 21st and 22d also caused moderate floods in the rivers of that district. At Richmond the James River overflowed most of the docks, but little or no damage resulted owing to the timely and accurate warning which had been given. A stage of 12 feet had been forecast, and 11.7 was recorded on the gauge.

In South Carolina the damage was limited for the most part to the retardation of the rice harvest.

The highest and lowest water, mean stage, and monthly range at 118 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on the Chart. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

Heights of rivers referred to zeros of gauges, October, 1898.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn	1,957	14	4.6	23–25	2.8	3–5	3.8	1.8
Reeds Landing, Minn	1,887	12	2.7	26, 27	0.3	1	1.4	2.4
La Crosse, Wis	1,822	12	3.7	30, 31	1.4	1–4	2.4	2.3
North McGregor, Iowa	1,762	18	3.1	31	0.6	1–5	1.5	2.5
Dubuque, Iowa	1,702	15	3.1	31	0.5	1	1.5	2.6
Leclaire, Iowa	1,612	10	1.7	31	0.4	1–10	0.8	1.3
Davenport, Iowa	1,596	15	2.8	31	0.8	1–11	1.4	2.0
Galland, Iowa	1,475	8	1.4	31	0.4	6–12, 14–16	0.7	1.0
Keokuk, Iowa	1,466	14	1.9	29	—0.4	6–11, 14–16	0.3	2.3
Hannibal, Mo	1,405	17	3.9	28	0.8	9–16	1.8	2.1
Grafton, Ill	1,307	23	5.9	30	2.4	14–16	3.6	2.6
St. Louis, Mo †	1,264	30	10.1	30	3.0	17	5.8	7.1
Chester, Ill	1,189	30	6.6	24, 25	1.3	18, 19	3.4	5.3
Cairo, Ill	1,073	45	16.5	31	7.6	10	11.1	8.9
Memphis, Tenn	843	33	8.9	30, 31	5.1	10, 23, 24	6.4	3.8
Helena, Ark	767	42	13.5	31	7.7	13	10.1	5.8
Arkansas City, Ark	635	42	14.7	22	10.5	16, 17	12.7	4.2

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River—Cont'd	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Greenville, Miss	595	42	11.7	31	8.8	15	10.3	2.9
Vicksburg, Miss	474	45	12.3	22	9.5	16,17	11.1	2.8
New Orleans, La	108	16	5.9	3	3.7	31	4.6	2.2
Arkansas River.								
Wichita, Kans	720	10	1.4	1	1.0	29-31	1.2	0.4
Fort Smith, Ark	345	22	10.6	13	3.2	10	4.8	7.4
Dardanelle, Ark	250	21	8.7	15	2.8	10	4.8	5.9
Little Rock, Ark	170	23	9.7	16	4.8	12	6.8	4.9
White River.								
Newport, Ark	150	26	14.4	23	8.2	19,30,31	10.9	6.2
Des Moines River.								
Des Moines, Iowa	150	19	3.2	29-30	2.8	13-16	3.0	0.4
Illinois River.								
Peoria, Ill	135	14	8.0	31	4.7	17	5.5	3.3
Missouri River.								
Bismarck, N.Dak	1,201	14	2.8	13,15	2.0	3-8	2.3	0.8
Pierre, S. Dak	1,006	14	2.8	19	2.2	11	2.5	0.6
Sioux City, Iowa	676	19	5.8	31	5.0	16,18	5.3	0.8
Omaha, Nebr	561	18	7.0	1	6.4	19-23	6.6	0.6
St. Joseph, Mo	373	10	1.6	1,2	0.8	23,24,28	1.1	0.8
Kansas City, Mo	280	21	7.6	19	5.2	16	6.3	2.4
Boonville, Mo	191	20	10.1	21	4.7	16	6.8	5.4
Hermann, Mo	95	24	10.2	22	4.2	16	6.5	6.0
Ohio River.								
Pittsburg, Pa	966	22	15.6	23	4.5	31	6.8	11.1
Davis Island Dam, Pa	960	25	14.6	23	2.0	6-8	5.1	12.6
Wheeling, W. Va	875	36	18.7	24	1.6	6-8	5.6	17.1
Parkersburg, W. Va	785	36	17.5	25	2.3	7	6.3	15.2
Point Pleasant, W. Va	703	39	21.2	25	1.8	2,3	6.9	19.4
Catlettsburg, Ky	651	50	24.5	26	1.0	3	8.2	23.5
Portsmouth, Ohio	612	50	24.3	26	2.9	3,4	9.0	21.4
Cincinnati, Ohio	499	50	24.8	27	4.5	6	10.1	20.3
Louisville, Ky	367	28	9.8	28	3.5	8	5.7	6.3
Evansville, Ind	184	35	17.1	31	4.1	8	6.9	13.0
Paducah, Ky	47	40	11.8	31	4.0	9	6.8	7.8
Allegheny River.								
Warren, Pa	177	7	5.2	24	0.0	1-21	1.0	5.2
Oil City, Pa	123	13	5.5	24	0.4	4-6	1.9	5.1
Parkers Landing, Pa	73	20	6.2	25	0.6	4,5	2.0	5.6
Freeport, Pa	26	20	10.0	25	0.8	4-7	3.5	9.2
Conemaugh River.								
Johnstown, Pa	64	7	9.0	22	1.0	3-5	2.1	8.0
Red Bank Creek.								
Brookville, Pa	35	8	1.6	23	0.2	1-4	0.7	1.4
Beaver River.								
Ellwood Junction, Pa	10	14	1.9	23	— 1.2	13-18	—0.3	3.1
Cumberland River.								
Burnside, Ky	434	50	7.6	20	1.0	5	3.9	6.6
Carthage, Tenn	257	30	8.0	23	1.4	5	4.1	6.6
Nashville, Tenn	175	40	10.8	24	1.8	1,2	5.6	9.0
Great Kanawha River.								
Charleston, W. Va	61	30	20.0	23	4.9	31	7.3	15.1
New River.								
Hinton, W. Va	95	14	8.3	23	1.6	1-4	3.1	6.7
Licking River.								
Falmouth, Ky	30	25	4.8	24	0.9	1-4	2.3	3.9
Miami River.								
Dayton, Ohio	69	18	2.0	21,24 26,30	1.1	2,3	1.6	0.9
Monongahela River.								
Weston, W. Va	161	18	6.3	22	— 1.2	3-6	0.4	7.5
Fairmont, W. Va	119	25	13.3	22	0.0	1-8	1.9	13.3
Greensboro, Pa	81	18	16.0	22	6.5	1-5	8.2	9.5
Lock No. 4, Pa	40	28	21.6	23	5.7	4-7	8.2	15.9
Cheat River.								
Rowlesburg, W. Va	36	14	7.0	22	0.6	3-6	2.3	6.4
Youghiogheny River.								
Confluence, Pa	59	10	6.0	23	0.5	3,4	2.1	5.5
West Newton, Pa	15	23	10.2	23	0.1	2-7	1.4	10.1
Muskingum River.								
Zanesville, Ohio	70	20	10.2	24	6.6	5	7.4	3.6
Tennessee River.								
Kingston, Tenn	534	25	6.5	6	1.0	2-3	3.5	5.5
Chattanooga, Tenn	430	33	17.6	7	3.2	3	7.2	14.4
Bridgeport, Ala	390	24	13.5	7	1.7	3,4	5.1	11.8
Florence, Ala	220	16	9.9	9	1.5	6	4.4	8.4
Johnsonville, Tenn	94	21	12.2	11	2.6	7,8	6.1	9.6

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Clinch River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Speers Ferry, Va	156	20	2.8	23	— 0.6	2	0.1	3.4
Clinton, Tenn	46	25	7.0	25	2.4	4	4.6	4.6
Wabash River.								
Mount Carmel, Ill	50	15	5.1	26	2.1	11,12	3.7	3.0
Red River.								
Arthur City, Tex	688	27	4.7	16-31	4.4	2-7	4.6	0.3
Fulton, Ark	565	28	5.4	10	2.7	6-8	3.6	2.7
Shreveport, La	449	29	2.2	14	0.6	10,11	1.4	1.6
Alexandria, La	139	33	3.3	1-3	— 1.1	17	0.4	4.4
Atchafalaya Bayou.								
Melville, La	100*	31	15.3	1,2	11.6	20	13.9	3.7
Ouachita River.								
Camden, Ark	340	39	12.1	23	3.8	4	6.3	8.3
Monroe, La	100	40	13.2	27	4.5	1	3.2	8.7
Yazoo River.								
Yazoo City, Miss	80	25	2.6	13	0.3	1,2	1.5	2.3
Chattahoochee River.								
Columbus, Ga	140	20	26.4	4	2.5	31	7.9	23.9
Flint River.								
Albany, Ga	80	20	12.0	10,11	0.8	1,2	6.0	11.2
Cape Fear River.								
Fayetteville, N.C	100	38	10.0	23,31	1.4	18	3.9	8.6
Columbia River.								
Umatilla, Oreg	270	25	4.1	1	2.3	31	3.0	1.8
The Dalles, Oreg	166	40	5.6	1	2.8	29-30	4.0	2.8
Willamette River.								
Albany, Oreg	99	20	2.0	2	1.0	5-15,20-31	1.1	1.0
Portland, Oreg	10	15	3.9	3	0.7	25	2.3	3.2
Edisto River.								
Edisto, S. C	75	6	5.2	8,9	2.7	1	3.9	2.5
James River.								
Lynchburg, Va	257	18	12.0	22	0.3	1,2	2.4	11.7
Richmond, Va	110	12	11.7	24	—0.1	1,9	1.9	11.8
Alabama River.								
Montgomery, Ala	265	35	28.8	10	1.0	3	10.6	27.8
Selma, Ala	212	35	28.5	11	0.9	4,5	11.7	27.6
Coosa River.								
Rome, Ga	225	30	23.8	6	2.0	1-3	6.8	21.8
Gadsden, Ala	144	18	22.0	8	0.7	3	8.0	21.3
Tombigbee River.								
Columbus, Miss	285	33	1.5	11	—2.8	8,31	—1.3	4.3
Demopolis, Ala	155	35	3.5	14	—2.2	3	0.4	5.7
Black Warrior River.								
Tuscaloosa, Ala	90	38	4.8	24	—1.0	5	1.4	5.8
Pedee River.								
Cheraw, S. C	145	27	12.5	24	1.2	5	3.7	11.3
Black River.								
Kingstree, S. C	60	12	4.5	15	2.4	31	3.4	2.1
Lumber River.								
Fairbluff, N.C	10	6	2.6	19	1.0	4	1.6	1.6
Lynch Creek.								
Effingham, S.C	35	12	7.3	12	3.5	3	4.8	3.8
Potomac River.								
Harpers Ferry, W. Va	170	16	13.2	23	0.5	1,2	2.7	12.7
Roanoke River.								
Clarksville, Va	155	12	8.5	23	— 0.5	17-18	2.2	8.0
Sacramento River.								
Red Bluff, Cal	241	23	—0.4	25	— 0.7	1,18,19	—0.6	0.3
Sacramento, Cal	70	25	7.9	6,7	7.5	1,2,18-24	7.3	0.4
Santee River.								
St. Stephens, S.C	50	12	8.6	7	7.2	23-25	7.9	1.4
Congaree River.								
Columbia, S.C	37	15	6.2	23	0.3	16-18	1.4	5.9
Wateree River.								
Camden, S.C	45	24	25.2	7	5.3	19	10.4	19.9
Savannah River.								
Augusta, Ga	130	32	24.0	6	7.1	2	11.5	16.9
Susquehanna River.								
Wilkesbarre, Pa	178	14	6.2	27	0.0	1-6	3.3	6.2
Harrisburg, Pa	70	17	8.3	24	0.7	3-7	3.3	7.6
Juniata River.								
Huntingdon, Pa	80	24	9.7	22	2.7	17,18	3.8	7.0
W. Br. of Susquehanna.								
Williamsport, Pa	35	20	9.0	23	0.5	2-4	2.6	8.5
Waccamaw River.								
Conway, S.C	40	7	3.4	3	2.0	17	2.6	1.4

*Distance to Gulf of Mexico. †Record for 30 days.

THE WEATHER OF THE MONTH.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

The statistical aspects of the weather of the month are presented in the tables which form the closing part of this REVIEW. Table I, in particular, contains numerous details that are important in the study of climatology. The numerical values in the tables have been generalized in a number of cases, the results appearing on Charts Nos. III to VIII, inclusive.

PRESSURE AND WIND.

Normal conditions.—The geographic distribution of normal barometric readings at sea level and under local gravity for October is shown by Chart V of the MONTHLY WEATHER REVIEW for October, 1893.

In October normal pressure is highest over the South Atlantic and east Gulf States, Tennessee, the lower Ohio Valley, and the coast of Oregon, where it is 30.10 inches or more. It is